

MOSQUITOES AND OTHER BLOOD-SUCKING ARTHROPODS OF THE UPPER SHIRI RIVER, NYASALAND

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This paper deals with the mosquitoes and other sanguivorous Arthropods observed in a relatively small area on the banks of the Shiri River, a little south of Lake Malombe, in the Nyasaland Protectorate, British Central Africa. Our captures were made during the dry season, from July to the beginning of November, in the year 1911. No special effort was made by us to collect such material, and no search for the breeding-places of mosquitoes was undertaken.

Our camp occupied a position about 200 yards from the river, the intervening space being comparatively free from 'bush' or other forms of vegetation. Hereabouts the river banks were low, and partly or wholly submerged during the rains. Nearby the banks were elevated and clothed with tall forest trees, and beneath them there was a dense and almost impenetrable undergrowth. Two-thirds of the river was rendered impassable by the 'sudd,' which was composed of a dense floating platform of aquatic plants, serving as a retreat for many species of birds, the crocodile and the hippopotamus. The sudd consisted largely of grasses, and in places extensive colonies of papyrus; the fringe being composed chiefly of the beautiful 'water caltrops' (*Trapa bispinosa*) and the equally troublesome 'cabbage' or 'duckweed' (*Pistia stratiotes*).

MOSQUITOES (CULICIDAE).

Anopheles (Myzorrhynchus) mauritanus, Grandpré. This fine Anopheline was by no means common in our camp, as in all only ten examples were captured; nearly all of these came into our dining-hut

while we were sitting at the table after dark. It is just possible that they may have been attracted by the artificial light; but of this we could not be certain. It did not seek shelter in the tents, as in the case of *Anopheles funestus*, and, therefore, does not appear to be a strictly 'domestic' species. With one exception, the specimens were of the dark form such as has been recorded from south of the Zambesi, and were characterized by the absence of spots either upon the costa or the fringe; the palpi presented three very narrow bands, the tips were in most cases black. The dates of capture were:— July, 1911; 1st August, 1911; 3rd August, 1911; 16th September, 1911; 18th September, 1911; 21st September, 1911.

Anopheles (Cellia) pharoensis, Theobald. One specimen only. This was taken in the dark-room tent, 3rd August, 1911.

Anopheles (Pyretophorus) costalis, Loew. Only one example of this mosquito was captured, during the month of August.

Anopheles (Myzomyia) funestus, Giles. This malaria-carrying mosquito was the most abundant of all the Anophelines observed by us. On July 31st, we decided to fix our permanent camp on the banks of the Shiri, opposite Matutas village, but our tents became so badly infested with this mosquito that we decided to abandon the site, selecting a more open spot a short distance away. Our first camping ground in this locality was surrounded by tall and, for the most part, densely foliaged trees, and was distant from the river about 80 yards. The permanent site of the camp was 200 yards from the water in practically open country. We found, however, that this Anopheline was equally abundant in both places: on August 2nd, one hundred and eleven specimens of this species were counted in one of the tents, and there were certainly an equal number present in the other tent. The temperature on this occasion at 3 a.m. was 46° F., at midday 86° F. in the shade, and at 8.30 p.m. 55° F. On August 9th, one hundred and sixty-two specimens of this species were captured in one of the tents. These consisted of thirty ♂♂, twelve unfed ♀♀ and one hundred and twenty ♀♀ which contained blood. This total does not, however, represent the actual number present in the tent, as large numbers escaped and many remained uncaptured, so that there were probably half as many again as the total captures, and there was certainly an equal number present in the other tent. This was the only occasion on

which we attempted to catch as many individuals as possible with the view of ascertaining the ratio of sexes, the proportion of fed and unfed females, and the approximate number present in the tent. Further captures were made on August 14th and 31st, when twenty-three ♀♀ and three ♂♂, sixty-eight ♀♀ and eleven ♂♂ were captured respectively. We consider that the figures given for August 9th may be taken as representing the approximate numbers present daily in either tent at that period; but we noticed even larger numbers on several occasions. During this time the tents were opened daily at each end, and as many mosquitoes as possible driven out, but as already stated we found no diminution in the numbers. The largest numbers observed were always in the darker portions of the tent, such as the angles of the roof and sides, between the boxes and on various garments. We also observed that they settled freely upon freshly skinned birds, especially guinea-fowls. We also observed on many occasions large numbers flying into the tents in the early morning between dawn and sunrise, the chief point of entrance being at the upper portion of the opening, through which they passed in more or less continuous flight until the rising sun put an end to their movements. Our native employees, about fifty in number, slept in the open about 15 to 25 yards from our tents. The nearest native village being on the opposite side of the river and about half a mile distant, we came to the conclusion that the principal food supply of these mosquitoes was obtained from the natives in our camp.

Mansonioides uniformis, Theobald. It was by far the most abundant of all the mosquitoes, and also the most vicious and persistent biter. It attacked one at any time of the day or night, but was most troublesome shortly after sunset. It simply swarmed along the river and its immediate vicinity, but occurred also in the bush in places far remote from water. It was not, however, 'domestic' in its habits, though a few specimens were taken in our tents during the day. It was equally obnoxious on the lower Shiri; but almost entirely disappeared in the Zambesi where the margin of the river was free from aquatic plants. It is highly probable, therefore, that it breeds chiefly in those portions of the Shiri where the 'sudd' is extensive, and where rootlets and stems of aquatic plants suitable for the attachment of the larvae abound.

... *Culex tigripes*, Grandpré. One female only was taken in one of the tents in our camp during the month of August.

... *Ingramia (Mimomyia) uniformis*, Theobald. One female of this rather rare mosquito was taken at night in our camp on August 11th, 1911. The beautiful pale blue reflections on the thorax were very marked in this example.

... *Etoleptomyia mediolineata*, Theobald. One female was taken at the camp.

... *Taeniorkynchus aurites*, Theobald. Examples of this species were taken in the camp, the date for which is now lost.

PSYCHODIDAE.

Phlebotomus minutus var. *africanus*, Newst. Three examples of this species were captured during the daytime, while at rest inside the tents; and one at artificial light, at 7.30 p.m. Other specimens, presumably of the same species, were also seen inside the tents at various times generally resting upon the canvas roof. On two occasions late at night examples attempted to bite one of us while under the mosquito net; the familiar high-pitched note, somewhat resembling that produced by a mosquito but much fainter, was heard distinctly as the insects hovered round the face of its would-be victim; on the first occasion we were sleeping under canvas; the second time in our large mud-house.

The first example was taken in the middle of July; the others were seen during August, and the last one towards the end of September. It is evident, therefore, that this insect occurs in Nyasaland during the dry season as it does also in Malta, and possibly also in other parts of Africa.

TABANIDAE.

Tabanus taeniola var. *variatus*, Walker, occurred very sparingly towards the end of August, four specimens only being seen and captured. These were all females. One was captured inside one of our tents, one was caught on a dead hippopotamus, and two were attracted by the fresh, moist mud on the walls of our hut.

Tabanus africanus, Gray. Two females of this handsome species were also attracted by the fresh mud which covered the walls of the hut. None was seen after the moisture had evaporated from the mud.

PUIPARA.

Echestypus sepiaceus, Speiser. A number of specimens were taken from a young Kudu bull which was killed five miles west of our camp on September 14th, 1911.

Olfersia ardeae, Macq. Two examples of this Hippoboscid were taken from a freshly killed Goliath heron (*Ardea goliath*), August 22nd, 1911. It is an extremely active insect, and the specimens were caught with difficulty.

HEMIPTERA (Family CAPSIDAE).

Trigonotylus brevipes, Jak. This minute green bug was first observed in our camp an hour after sunset, on August 10th, 1911, when it bit one of us severely on the back of the hand; the proboscis being driven so firmly into the skin as to prevent its immediate escape, so that one was enabled to examine it carefully with a pocket-lens. Subsequently this insect occurred in large numbers at irregular intervals during August and September, always apparently attracted by artificial light, and always annoying by its persistent efforts to bite. It cannot, however, be considered a true blood-sucking insect, and we believe that its bites are made out of mere curiosity rather than to obtain blood. In life, it is of an almost uniform grass-green colour, with a narrow, pale streak below the costa of the elytra, antennae dull crimson-red, basal portion of terminal segment with an indistinct greyish ring; eyes black; abdomen vivid green; legs slightly paler, especially the hind femora; terminal segments of tarsi black.

TICKS. IXODIDAE.

Though a number of animals were examined during our stay in the Shiri Valley, comparatively few of them were found infested by ticks. The following is a list of all the species observed.

Rhipicephalus neavei, Warburton. One male and four females from a Kudu, five miles west of camp, 1911, many specimens from a buffalo, 3rd August, 1911; two males and two females off Nswala or Mpala antelope, Upper Shiri Valley, 8th August, 1911; one female off an eland, Upper Shiri Valley, 20th August, 1911.

Rhipicephalus jalcatus, Neumann. Off buffalo, 3rd August, 1911.

Rhipicephalus simus, Neumann. Three males from buffalo, Upper Shiri Valley, 3rd August, 1911.

Rhipicephalus maculatus, Neumann. One male from buffalo, Upper Shiri Valley, 3rd August, 1911.

Hyalomma aegyptium, Linn. Off buffalo, Upper Shiri Valley, 3rd August, 1911.